	L #	Hits	Search Text	DBs	Time Stamp
1	L1	112	(cmp or chemical adj mechanical adj polishing) and pad adj wear and pad adj conditioning	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	2005/05/04 14:44
2	L2	1288	(pad adj condition or pad adj conditioning)	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	2005/05/04 14:44
3	L3	112	1 and 2	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	2005/05/04 14:44
4	L4	8	conditioning adj parameter and 3	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	2005/05/04 14:44

	L #	Hits	Search Text	DBs	Time Stamp
5	L5	4	(model or software or program or memory) and 4	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	2005/05/04 14:45
6	L7	5	6 and 1	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	2005/05/04 14:46
7	L8	1705	(451/5).CCLS.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	2005/05/04 14:47
8	L9	5	1 and 8	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	2005/05/04 14:47

	L #	Hits	Search Text	DBs	Time Stamp
9	L6	2149	(438/692).CCLS.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	2005/05/04 14:53

US-PAT-NO: 6245679

DOCUMENT-IDENTIFIER: US 6245679 B1

TITLE: Apparatus and methods for **chemical-mechanical polishing** of semiconductor wafers

---------- KWIC ---------

TITLE - TI (1):
Apparatus and methods for **chemical-mechanical polishing** of semiconductor wafers

Brief Summary Text - BSTX (3):
The present invention relates to the **chemical-mechanical polishing** of semiconductor wafers.

Detailed Description Text - DETX (2):
The present invention is a result of the recognition that a particle-containing slurry is not required for **chemical-mechanical polishing** activity. Instead, **chemical-mechanical polishing** activity in the present invention derives from the interaction of nanoasperities on the pad surface with the substrate in combination with a particle-free reactive liquid solution. This absence of particles enables the incorporation of a number of desirable features into the liquid delivery system, particularly recirculation to ensure stable performance, removal of waste products, and filtration of contaminant particles.

Detailed Description Text - DETX (4):
Asperity contact models for **chemical-mechanical polishing** have been described in Cook et al. (U.S. Pat. No. 5,489,233) and Yu et al. (U.S. Pat. No. 5,441,598). However, prior art has ascribed the role of asperities as merely vehicles for the delivery of slurry particles to the substrate surface and have dealt only with the use of microasperities and

macroasperities. This
may arise in part from a lack of recognition of the criticality of the size
ranges of asperities which occur on a pad surface. Conventional asperity
contact models address asperities of sizes in the micron range and assume
simple deformation to accommodate to the substrate surface. A key aspect to
the present invention is a recognition of the criticality of yet smaller
asperities in the interaction with the substrate in the event that they do not
permanently deform during contact. These nanoasperities, of a size range
equivalent to the size of slurry particles, are expected to form high local
contact stresses in the substrate during the polishing process. By judicious
choice of the hardness of the materials of construction, so as to avoid
permanent plastic deformation of the nanoasperities, and by the use of
chemically reactive liquid solutions during this contact, it is possible to
effect contact-mediated reactions, which are analogous to those which occur
during slurry particle contact, which result in material removal primarily in
the zone of contact. This then gives rise to the same spatial selectivity as
is observed during polishing with particle-containing slurries, but without the
need for particles in the system. This will be made clear in the subsequent
discussion and examples.

Detailed Description Text - DETX (36):
Another advantage of the use of such reactive liquid solutions in the
present invention is that it permits efficient recirculation and re-use.
Because the liquid does not contain particulate matter, filtration of
particulate contaminants resulting from **pad wear,** substrate polishing
byproducts, or external contaminants is easily performed with conventional
filtration equipment. This prevents possible scratching or other damage to the
substrate being polished and makes substrate cleaning after polishing much

easier.

Claims Text - CLTX (9):
6. The apparatus according to claim 1 wherein said nanoasperities are regenerated periodically by **pad conditioning**.

Claims Text - CLTX (27):
20. The method according to claim 15 wherein said nanoasperities are regenerated periodically by **pad conditioning**.

Current US Original Classification - CCOR (1):
438/692